20. (Amended) The process according to Claim 1, wherein said hydrocarbon feedstock is selected from the group consisting of pulp and paper byproducts, sugars, natural fatty acids and alcohols.

A marked-up version of amended claims 1, 19, and 20 showing the changes made is attached to the back of this response.

REMARKS

Applicants respectfully request reconsideration of this application.

Claims 1-20 are presently in the application.

The present invention relates to an oligomerization process in which hydrocarbon feedstocks that include sulfur-containing molecules are contacted with a hydrotreating catalyst in the absence of hydrogen, optionally in the liquid phase. The catalyst is a heterogeneous catalyst selected from supported reduced metals, metal oxides, metal sulfides and combinations thereof. Preferred catalysts include mixed nickel and molybdenum oxides or mixed cobalt and molybdenum oxides. The process can oligomerize sulfur compounds so that sulfur-containing feedstocks can be treated without deactivating the catalysts. Accordingly, untreated refinery streams can be used as oligomerization feedstocks without preliminary desulfurization.

Claim 1 has been amended to limit the hydrocarbon feedstock to one selected from the group consisting of C_4 olefin streams, C_5 olefin streams, C_4 and C_5 olefin streams, (support for which is found at page 6, lines 19-20), light FCC gasoline, (support for which is found at page 5, line 28 to page 6, line 1), pygas (support for which is found at page 7, line 9), coker streams (support for which is found at page 7, line 9), C_{7+} reformate streams and light reformate streams containing benzene and toluene (support for which is found at page 9, lines 6-7), pulp and paper byproducts, sugars, natural fatty acids and alcohols (support for which can be found at page 8, lines 5-8).

Claim 19 has been amended to depend from claim 3 rather than claim 1 and further to limit the hydrocarbon feedstock to one selected from the group consisting of FCC gasoline, C_{7+} reformate streams and light reformate streams containing benzene and toluene.

Claim 20 has been amended to limit the hydrocarbon feedstock to one selected from the group consisting of pulp and paper byproducts, sugars, natural fatty acids and alcohols.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-15 have again been rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 4,788,376 to Mazurek et al. (Mazurek) in view of U.S. Patent No. 5,157,201 to Norris.

This rejection is respectfully traversed.

The Examiner bases her rejection on an argument that one skilled in the art would arrive at the present invention based on Mazurek's oligomerization process for a propylene-containing feed containing 1-1000 ppm diene, which feed can be derived from pyrolysis gas, combined with Norris' teaching that a typical propylene feedstock normally contains from about 5-50 ppm of various sulfur species that can be incorporated in higher olefins produced during oligomerization. Yet Norris' invention is solely directed to removing sulfur from feeds using metal oxides to *adsorb* sulfur species (column 4, lines 24-25) at low temperatures of 50° to 175°C (122° to 347°F) (column 4, lines 39-40), rather than treating at the presently claimed temperatures of 392° to 600°F. Thus, one skilled in the art would not simply substitute a sulfur-containing propylene feed in the process of Mazurek, but would employ an adsorbent at moderate temperatures as taught by Norris.

To otherwise interpret Norris disregards the teaching of the reference as a whole. It is well understood that the teaching of a reference *as a whole* should be considered. In *In re Wesslau*, 353 F.2d 238, 147 USPQ 391 (CCPA 1965), the court cautioned that "it is impermissible within the framework of section 103 to

pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." In *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 230 USPQ 416 (Fed. Cir. 1986), *cert. denied*, 484 U.S. 823 (1987), *on remand*, 10 USPQ2d 1929 (N.D. Calif. 1989), the Federal Circuit held that a single line in a prior art reference should not be taken out of context and relied upon with the benefit of hindsight to show obviousness. Rather, a reference should be considered as a whole, and portions arguing against or teaching away from the claimed invention must be considered.

Because Norris teaches feeds with relatively low sulfur content, its combination with Mazurek fails to disclose or suggest, *a fortiori*, the subject matter of present claims 12, 14 and 16 which require greater than 50 ppm sulfur, 50 ppm being the upper limit of sulfur taught by Norris as being the "typical propylene feedstock" (column 1, lines 41-42).

The Examiner has stated at page 5, lines 1 and 2 of her office action that "applicants have not demonstrated the criticality of 1% sulfur in the feed." However, the advantage of a process capable of operating with such high sulfur feeds is quite manifest from a commercial standpoint inasmuch as the present process can dispense with costly sulfur removal treatments prior to olefin oligomerization. Examples 3 and 5 of the present application show operation of the invention with 1 wt.% thiophene feeds being converted at more than 95% conversion of thiophene to oligomers.

The Examiner's statement bridging pages 4 and 5 that "[a]pplicants' 95% sulfur conversion would naturally result from the process produced by the combined teachings of Mazurek et al. and Norris because the same conditions and feed amounts would yield a similar conversion percentage" is incorrect. One skilled in the art applying Norris to Mazurek would not employ the high temperatures required by the present invention inasmuch as Norris suggests the adsorption of sulfur-containing species at low temperatures as discussed above.

The Examiner has argued that Norris is cited as a secondary refer nce, not for temperature but rather the conventionality of sulfur in the feed. Nevertheless, it is urged that one skilled in the art would look upon Norris' teachings *as a whole*, including low temperatures. Given such, it is unlikely that one skilled in the art relying on Norris would likely *raise* Mazurek's operating temperatures as suggested by the Examiner, given the cases cited above.

Finally, by the present amendment, it is observed that Norris' teaching at column 1, lines 41-42, relied upon by the Examiner that "the typical propylene feedstock normally contains from about 5-50 ppm of various sulfur species" is inapposite to the presently claimed subject matter inasmuch as the present process no longer contemplates such a "typical propylene feedstock." Instead, the presently claimed process is limited to hydrocarbon feedstocks selected from the group consisting of C_4 olefin streams, C_5 olefin streams, C_4 and C_5 olefin streams, pygas streams, coker streams, light FCC gasoline, C_{7+} reformate streams, light reformate streams containing benzene and toluene, pulp and paper byproducts, sugars, natural fatty acids and alcohols. Claim 19 is further limited to a hydrocarbon feedstock selected from the group consisting of light FCC gasoline, C7+ reformate streams and light reformate streams containing benzene and toluene, while the hydrocarbon feedstock of claim 20 is selected from the group consisting of pulp and paper byproducts, sugars, natural fatty acids and alcohols. Accordingly, it is respectfully urged that one skilled in the art would not look to Norris' teachings concerning "typical propylene feedstock" to solve the problems associated with the feeds treated by the present process.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present invention is neither disclosed nor suggested by the combination of Mazurek and Norris. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 1-5 and 8-15 have been finally rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 4,098,839 to Wilms et al. (Wilms) in view of Norris. Wilms is cited as disclosing oligomerization of C_2-C_5 olefins over a

catalyst containing molybdenum and cobalt and/or nickel supported on alumina which is activated in an oxidizing atmosphere to provide metal oxides. Wilms describes a catalyst "substantially insensitive to sulfur . . . components in the olefin feedstocks" (column 2, lines 10-12) and teaches feedstocks containing 50 ppm sulfur (column 6, lines 21-22). Norris is again cited as teaching that higher olefin plants typically use a propylene feedstock which normally contains 5-50 ppm of various sulfur species, and that sulfur species are incorporated into higher olefins during oligomerization.

The Examiner concludes it would be obvious to oligomerize sulfur- and propylene-containing feedstocks with the catalysts specified in the present claims in view of Wilms because Norris teaches use of 5-50 ppm sulfur-containing feeds for oligomerization as well as incorporation of sulfur into higher olefins during oligomerization. The Examiner argues selecting any combination of metals and metal oxides would be obvious to one skilled in the art, including applicants' NiMo/alumina or mixed NiMo or CoMo oxides, given the reference's teaching that such catalysts are known to accomplish the desired conversion.

This rejection is respectfully traversed.

Wilms oligomerizes unsaturated hydrocarbons with a molybdenum sulfide catalyst which has been treated in an *oxidizing* atmosphere at 300°-700°C to provide "an intermediate phase between molybdenum oxide and molybdenum sulfide [which] constitutes the active component of the catalyst" (column 3, lines 10-13). Applicants note that Wilms provides comparative Examples 4 and 5 using supported MoO_3 catalyst and MoS_2 catalyst, respectively, to process a feed containing 50 ppm sulfur. However, Wilms teaches that the product yield obtained in the absence of sulfur in the feed "had almost the same composition than the one obtained by Example 1" with 50 ppm sulfur in the feed. See, Wilms, column 6, lines 26 to 31. Thus Wilms teaches away from the present invention's process of claim 3 which oligomerizes sulfur-containing molecules. The Examiner has argued that "conversion product diff rences between a non-sulfur containing feed and a sulfur containing feed are not the subject of applicants' claims" and

that one "can not distinguish the claims by differences not defined in the claims." However, applicants respectfully submit that such differences are defined in the claims because claim 3 *requires* oligomerizing sulfur compounds which would clearly result in differences between products formed in the absence or presence of sulfur. In contrast, Wilms' products in the absence or presence of sulfur are described as "almost the same." The Examiner has responded to this shortcoming of Wilms by arguing circuitously that "the combined teachings suggest oligomerizing in the presence of sulfur" so that "similar conversion would occur" (Office Action of January 24, 2002 at page 10, lines 3 to 5). However, applicants respectfully submit that this blanket statement is unsupported inasmuch as one of the references relied upon (Wilms) teaches away from such oligomerizing of sulfur by noting that its products in the absence or presence of sulfur "are almost the same." One skilled in the art could thus not reasonably expect such oligomerization to occur in the presently claimed process of claim 3.

Moreover, with regard to claims 1-5 and 8-15, the combination of Wilms and Norris fails to disclose or suggest the significantly higher operating temperatures required by the present claims. Wilms discloses oligomerizing at relatively low temperatures of 40°-180°C (104°-358°F). Similarly, Norris discloses oligomerizing at low temperatures of 50° to 175°C (122° to 347°F) (column 4, lines 39-40). In contrast, the present invention employs higher temperatures (392°-600°F) which enhance reactivity of the catalyst to form oligomers at conditions "more severe than typical conditions used to conduct oligomerizations/polymerizations" (specification at page 6, lines 12-15). Finally, it is urged that neither Wilms nor Norris suggests the process of present claims 12 and 14 wherein the hydrocarbon feedstock comprises greater than 50 ppm sulfur-containing compounds and up to about 1 wt.% (10000 ppm) of sulfur-containing molecules.

The Examiner relies on Norris as teaching "it is known that sulfur which may be present in the feed is incorporated into higher olefins" and that "one of ordinary skill in the art desiring or willing to accept a higher level of sulfur in the

oligomer would process a feed with higher amount of sulfur" inasmuch as "it is known that sulfur present in the feed will become part of the oligomer" (Office Action of January 24, 2002, page 7, lines 12-16). Despite this assumption, it is respectfully submitted that one skilled in the art would look to Norris' teachings respecting propylene feeds for processing the feedstocks of the present invention as presently amended.

Norris' teaching at column 1, lines 41-42, relied upon by the Examiner that "the typical propylene feedstock normally contains from about 5-50 ppm of various sulfur species" is inapposite to the presently claimed subject matter inasmuch as the present process no longer contemplates such a "typical propylene feedstock." Instead, the presently claimed process is limited to hydrocarbon feedstocks selected from the group consisting of C_4 olefin streams, C_5 olefin streams, C_4 and C_5 olefin streams, light FCC gasoline, C_{7+} reformate streams and light reformate streams containing benzene and toluene. Accordingly, it is respectfully urged that one skilled in the art would *not* look to Norris' teachings concerning "typical propylene feedstock" to solve the problems associated with feeds treated by the present process.

With regard to the Examiner's comment "it is unclear which passage applicants are referring to because page 4 of the office action only has 21 lines," applicants note that they were referring to page 4, lines 21-26 of *their* response mailed May 25, 2001 which erroneously implied Mazurek teaches using a "sulfur compound adsorbing catalyst comprising metal oxide to remove sulfur contaminants." Applicants again wish to emphasize that the reference referred to was Norris, not Mazurek which appears silent on the topic of sulfur contaminants.

Applicants also wish to point out an apparent error in the Examiner's rejection based on Wilms and Norris, where Mazurek is relied on (January 24, 2002 Office Action at page 6, lines 15-16 and page 7, lines 16-19). Clarification is requested and, if Mazurek is intended to be relied upon as a reference in this rejection, it should be positively stated at the outset of the rejection.

RESPONSE UNDER 37 CFR 1.111
U.S. Application No. 09/429,295

The Examiner contends at page 8, lines 1-4 of the January 24, 2002 Office Action that "applicants' slightly higher minimum temperature range is not considered to be a patentable distinction over the temperature" inasmuch as Wilms' lower temperatures "would accomplish a similar conversion" to the lower end of applicants' claimed temperature range.
The Examiner further notes that "[a]pplicants have not submitted evidence of criticality with respect to the claimed range.

In response, applicants respectfully direct the Examiner's attention to Figure 1 of the present specification which shows a significantly greater effectiveness for diene conversion at a temperature within the presently claimed range (450°F) as compared to temperatures within the disclosed range of Wilms--176°F to 356°F, i.e., 300°F. It is respectfully submitted that this advantage of the presently claimed process is nowhere suggested by Wilms' teachings. Accordingly, one skilled in the art would not likely find it advantageous to employ temperatures beyond the 356°F limit of Wilms.

Given these distinctions, it is respectfully submitted that the subject matter of the present claims is neither disclosed nor suggested by the combination of Wilms and Norris. Accordingly, withdrawal of this rejection under 35 USC § 103(a) is respectfully requested.

The Examiner has now rejected claims 19-20 which can use light FCC gasoline hydrocarbon as feedstock over 1) Mazurek and Norris in view of U.S. Patent No. 5,000,837 to Harandi or 2) Wilms and Norris in view of U.S. Patent No. 5,000,837 to Harandi. The Examiner cites Mazurek and Norris or Wilms and Norris as above, and argues Harandi teaches that FCC gasolines are known sources of olefins. The Examiner further argues that inasmuch as Mazurek and Wilms "do not limit the source of olefins," one skilled in the art would find it obvious to obtain olefins from an FCC as the feedstock of the presently claimed process.

This rejection is respectfully traversed.

This combination of references suffers from the same deficiency respecting Norris as was argued above, namely, that one skilled in the art would not rely on Norris' teachings relating to oligomerization of sulfur compounds in propylene feeds in the context of the higher boiling feeds specified in the presently claimed process. Although Harandi teaches FCC light gas can contain olefins, there is no suggestion of oligomerizing the sulfur compounds in the feed as now required by claim 19 which depends from claim 3. With regard to the feeds of presently amended claim 20, it is respectfully submitted that none of the references cited in this rejection would direct one skilled in the art to utilize such feedstocks.

In view of the foregoing arguments, it is respectfully submitted that the subject matter of claims 19 and 20 is not obvious in view of the three references cited. Accordingly, withdrawal of this rejection is respectfully requested.

CONCLUSION

Applicants respectfully submit that the foregoing arguments, in light of the amendments made herewith, obviate all of the outstanding rejections in this case and place the application in condition for immediate allowance. Allowance of this application is therefore earnestly solicited.

Respectfully submitted,

By Edward F. Sherer

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RESPONSE UNDER 37 CFR 1.111
U.S. Application No. 09/429,295

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The following changes are being made to claims 1, 19 and 20:

1. (Thrice Amended) An oligomerization process comprising contacting a hydrocarbon feedstock comprising sulfur-containing molecules with a hydrotreating catalyst in the absence of hydrogen at a temperature ranging from about 392°F to about 600°F, wherein said hydrocarbon feedstock is selected from the group consisting of C_4 olefin streams, C_5 olefin streams, C_4 and C_5 olefin streams, pygas streams, coker streams, light FCC gasoline, C_{7+} reformate streams, light reformate streams containing benzene and toluene, pulp and paper byproducts, sugars, natural fatty acids and alcohols.

19. (Amended) The process according to Claim [1] 3, wherein said hydrocarbon feedstock is selected from the group consisting of light FCC gasoline, [coker streams and pygas streams] C_{7+} reformate streams and light reformate streams containing benzene and toluene.

20. (Amended) The process according to Claim 1, wherein said hydrocarbon feedstock is selected from the group consisting of [light FCC gasoline] pulp and paper byproducts, sugars, natural fatty acids and alcohols.

TRANSMITTAL FORM

In re		)	Before the Examiner:
Application of:	Brown, et al.	)	Nadine Preische
Serial No.:	09/429,295	)	Group Art Unit No.: 1764
Filed:	October 28, 1999	)	
For:	Conversion of Unsaturated Chemicals to Oligomers	)	Attorney Docket No.: 10196

ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Exhibit A

Sir:

[X] The undersigned hereby certifies having information and a reasonable basis for belief that this correspondence will be deposited as first-class mail with the United States Postal Service in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231, on April 24, 2002.

Laura Clark
(Typed or printed name of person mailing paper or fee)

Laura Clark
(Signature of person mailing paper or fee)

FAX RECEIVED
OCT 23 2002
GROUP 1700
OFFICIAL

Transmitted herewith is the Response Under 37 CFR 1.111 in the above-identified application.

[X] Fee for Response Under 37 CFR 1.111 is $0.00.

[X] Charge $0.00 to Deposit Account No. 05-1712.

[X] The Commissioner is hereby authorized to charge any additional fees which may be required by this paper, or credit any overpayment, to Deposit Account No. 05-1712. A duplicate copy of this Form is enclosed.

April 24, 2002
Date of Signature

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Edward F. Sherer

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Stephen H. Brown et al.

Serial No. 09/429,295

Filed: October 28, 1999

For: CONVERSION OF UNSATURATED CHEMICALS TO OLIGOMERS

Examiner: Nadine Preisch

Group Art Unit: 1764

EXHIBIT B

Assistant Commissioner of Patents
Washington, DC 20231

STATEMENT OF EDWARD F. SHERER

I was aware, several weeks ahead of time, that a response to a January 24, 2002 Office Action, that had issued for the above-identified application, needed to be filed by April 24, 2002 in order to respond within the three month response period set forth in the Office Action.

On April 24, 2002, I reviewed the response and then signed it along a Transmittal Sheet accompanying the Response. After signing the papers, I immediately instructed Laura Clark, Staff Support of Law Technology of ExxonMobil Chemical Company, to mail the materials on that day (April 24th) to the United States Patent and Trademark Office.

Date:

October 21, 2002

Respectfully submitted,

Edward F. Sherer

Edward F. Sherer
Registration No.: 29,588

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Stephen H. Brown et al.

Serial No. 09/429,295

Filed: October 28, 1999

For: CONVERSION OF UNSATURATED CHEMICALS TO OLIGOMERS

Examiner: Nadine Preisch

Group Art Unit: 1764

EXHIBIT C

Assistant Commissioner of Patents
Washington, DC 20231

STATEMENT OF LAURA CLARK

I am employed by ExxonMobil Chemical Company and work in Law Technology as a Staff Support. I have been in this position for three (3) years. My duties include sending documents to the United States Patent and Trademark Office.

On April 24, 2002, Edward F. Sherer instructed me to mail to the United States Patent and Trademark Office before the end of that day, a response with the transmittal sheet for the above above-identified Application.

Shortly after receiving this instruction, I signed the Certificate of Mailing for the papers, prepared a self-addressed postage-paid return postcard addressed to the Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231, made copies of the papers, placed the materials in an envelope addressed to the Assistant Commissioner of Patents and Trademarks, Washington, D.C. 20231, and sealed the envelope.

I then placed the envelope with the materials into an internal ExxonMobil mailbox for depositing with the United States Postal Service.

Respectfully submitted,

Laura Clark

Laura Clark

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Stephen H. Brown et al.

Serial No. 09/429,295

Filed: October 28, 1999

For: CONVERSION OF UNSATURATED CHEMICALS TO OLIGOMERS

Examiner: Nadine Preisch

Group Art Unit: 1764

EXHIBIT D

Assistant Commissioner of Patents
Washington, DC 20231

STATEMENT OF MELISSA ESTRADA

I am a contract employee working at ExxonMobil Chemical Company as a clerk in the Law Technology mailroom. As part of my job description, I have all outgoing mail for Law Technology metered with sufficient first class postage and then place the metered mail into an internal ExxonMobil mailbox prior to 3:30 p.m. for pick up by John Alfred. On April 24, 2002, I had all of the mail for Law Technology metered with sufficient postage for first class mail and then placed the mail into the internal ExxonMobil mailbox prior to 3:30 p.m.

Respectfully submitted,

Melissa Estrada

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Stephen H. Brown et al.

Serial No. 09/429,295

Filed: October 28, 1999

For: CONVERSION OF UNSATURATED CHEMICALS TO OLIGOMERS

Examiner: Nadine Preisch

Group Art Unit: 1764

EXHIBIT E

Assistant Commissioner of Patents
Washington, DC 20231

STATEMENT OF JOHN ALFRED

I am employed by ExxonMobil Chemical Company and work as a clerk in mailroom. I have been in this position for fourteen (14) years. My duties include mailing documents to the United States Patent and Trademark Office.

As part of my job description, I deposit mail for Law Technology with the United States Postal Service. The mail that Law Technology wants deposited with the United States Postal Service that day is placed into an internal ExxonMobil mailbox by 3:00 p.m. At approximately 3:30 p.m. on April 24, 2002, I went to the internal ExxonMobil mailbox, picked up all of the mail that Law Technology wanted deposited with the United States Postal Service, and deposited that mail on April 24th at the United States Post Office located in Baytown, Texas.

Respectfully submitted,

John Alfred